

## 4 Equipment / Furnishings (ATA 25)

### 4.1 Definition

*Those removable items of equipment and furnishings contained in the flight and passenger compartments. Includes emergency, galley and lavatory equipment. Does not include structures or equipment assigned specifically to other ... [systems]. (ATA 2200)*

### 4.2 Elements of Equipment

Equipment and furnishings include items in several parts of the aircraft. Examples of such equipment are given here:

- **In the flight compartment:** flight crew seats, tables, wardrobes, electronic equipment racks, and stowage facilities for manuals and other equipment.
- **In the passenger compartment:** seats, overhead storage compartments, wall coverings, carpets, wardrobes, movable partitions.
- **In buffets and galleys:** cabinets, ovens, refrigerators, coffee maker, electrical outlets and wiring, trolleys, garbage containers.
- **In the lavatories:** mirrors, seats, cabinets, dispensing equipment, electrical outlets and wiring (the wash basin and the closets are part of the water / waste system).
- **In the cargo compartment<sup>1</sup>:** equipment used to load and unload the aircraft; includes restrains and latches, rollers and drive systems.
- **In all parts of the aircraft, thermal insulation<sup>2</sup>** minimizes the losses of heat from the fuselage, stops the formation of condensation, and reduces the noise level in the fuselage. Thermal insulation is dimensioned in conjunction with the design of the air conditioning system.

Some aircraft, especially very large commercial transports, also offer space for additional equipment in the **under floor area**. The space can be used for *crew rest facilities*, galleys, a *bar*, or an *exercise room*. The need might arise to incorporate a *lift* in multideck aircraft.

**Emergency equipment** comprises items for use in emergency procedures such as *evacuation equipment*, life rafts, jackets, crash ax, flash lights, megaphone, protective gloves, emergency locator transmitters, underwater locator devices, first aid kits, and supplementary medical equipment. Fire extinguishers and oxygen equipment are part of their respective systems. Evacuation equipment facilitates *passenger* and *crew evacuation*. These procedures are explained below.

---

<sup>1</sup> Under the new **ATA 2200** allocated to "Cargo and Accessory Compartment (ATA 50) "

<sup>2</sup> Under the new **ATA 2200** allocated to "Cargo and Accessory Compartment – Insulation (ATA 50-60) "

### 4.3 Cabin Design

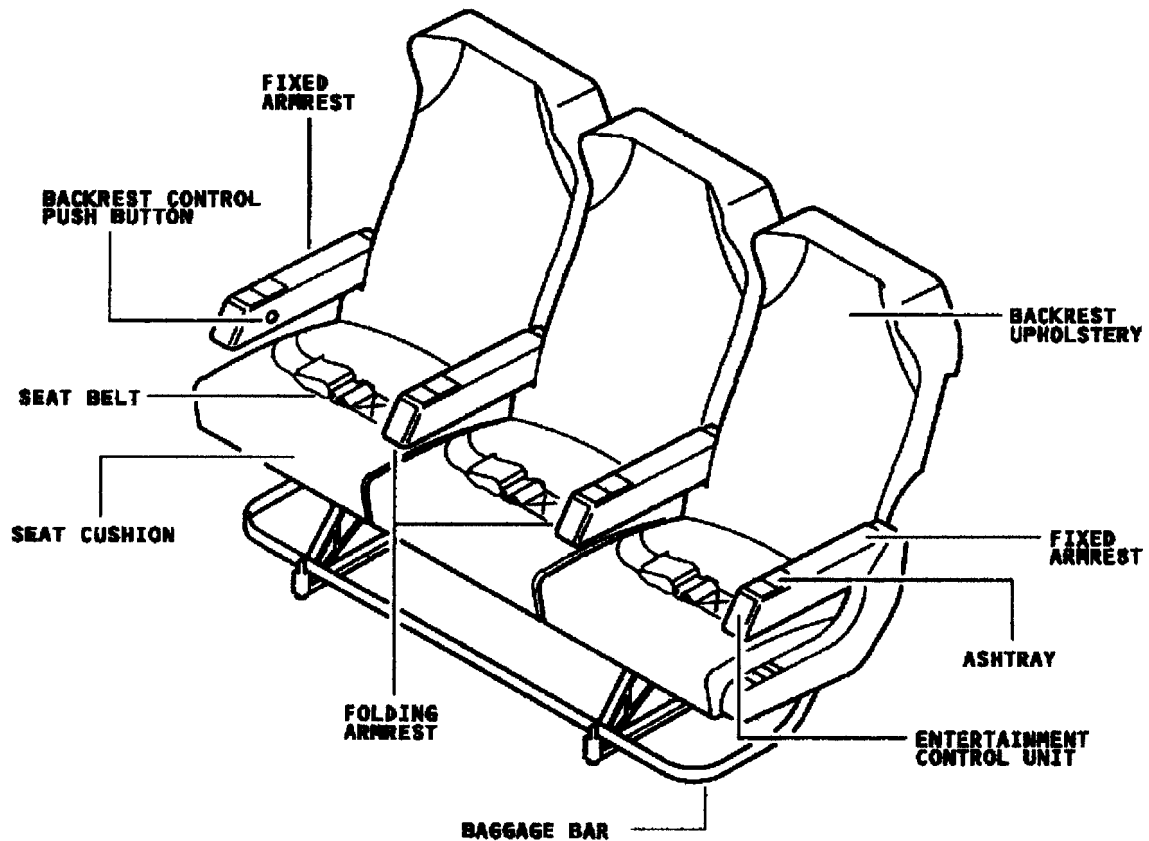
The cabin is the place where the paying customer has to be satisfied. Much attention is given to its design, starting during aircraft design, where an optimum cabin cross section has to be found. Designers have to find ways to create an aesthetically pleasing impression and a suggestion of spaciousness within the always limited dimensions of an aircraft (Figure 4.1). These design activities have an influence on the shape of ceiling *panels*, sidewall panels, *stowage compartment doors*, and *passenger service units* (PSU) located underneath the stowage compartment. *Cabin lighting* design is also part of this effort. The airlines would like to see their corporate design reflected not only outside but inside the aircraft. They may choose their own material, pattern, and texture for panel coverings, *dividers*, *curtains*, and *seats* and would select a suitable *carpet*. All cabin materials have to fulfill requirements related to fire, wear, and cleaning.



**Figure 4.1** Boeing 717: The result of a thorough cabin design (Granzeier 2001)

### 4.4 Passenger Seats

Passenger seats are probably the most important single item of equipment in the cabin. They should provide comfortable seating for many hours during normal flights and the best protection during a crash. Elements of a seat are shown in Figure 4.2. Not visible in this figure are the literature pocket and the folding table on the back of the seat. Seats are installed on *seat tracks* of the cabin floor structure. This allows flexibility in spacing the seats.



**Figure 4.2** Economy class passenger seats (A321, example)

The *seat pitch* is a comfort measure for seat spacing. It is the distance between corresponding points on two seats installed one in front of the other. The seat pitch is internationally given in inches. Seats in the first, business, and economy class feature different levels of comfort, and the seat pitch varies among these classes. Typical values today are:

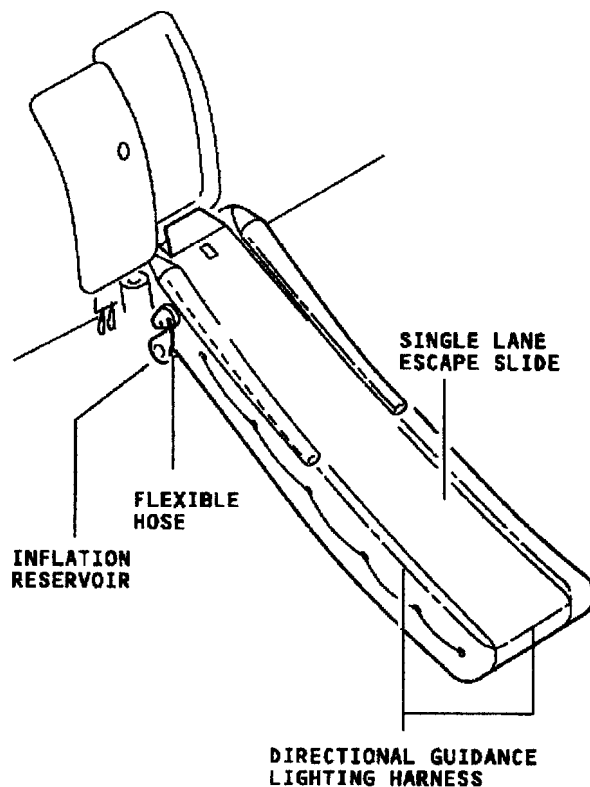
- first class: 62 in (1.57 m)
- business class: 40 in (1.02 m)
- economy class: 32 in (0.81 m)
- "high density": 30 in (0.76 m).

These numbers are not fixed but change with product policy of the airlines. During the last decades seat pitch has increased in the first class, but decreased in the economy class in a fight for low fares.

Seats are bought by the airline from specialized seat manufacturers as Buyer Furnished Equipment (BFE) and are then installed by the aircraft manufacturer into the new aircraft.

## 4.4 Emergency Evacuation

Rapid **evacuation of passengers and cabin crew** has to be possible in case of a crash landing. For airplanes with 44 passengers or more it must be shown that passengers and cabin crew can be evacuated to the ground within 90 s. This has to be possible with up to 50% of the emergency exits being blocked (**JAR-25**, section 803; **AC 25.803**). In an emergency, passengers leave the aircraft usually through emergency exits (these can also be the normal passenger doors) via inflatable *escape slides* (Figure 4.3).



**Figure 4.3** Escape slide (Airbus A321)

**Evacuation of flight crew from commercial aircraft** is intended either through passenger *emergency exits*, through top a *hatch*, or by using an escape rope to slide down from the flight deck through the opening *side windows*.

**Evacuation of crew from military combat aircraft** is usually achieved with *ejector seats* that allow the crew to abandon their aircraft at all flight conditions, ranging from high speed, high altitude to zero speed and zero height. The ejector seat is mounted in the aircraft on a slide rail and is propelled out of the aircraft by a rocket motor. After a predetermined time, the seat detaches from the person, who is brought to the ground by *parachute*. In some multicrew combat aircraft the crew are evacuated in an *escape module* that is jettisoned and parachuted to the ground.

## 4.5 Example: Airbus A321

Equipment and furnishings give comfort and safety to passengers in the *cabin* and to the crew in the *cockpit*. Equipment is also used for handling of cargo in the *cargo compartments*.

The **cockpit** is equipped with *adjustable seats for two crew members* (Figure 4.4). The A321 has a Fly-by-Wire flight control system steered with a side stick. The side stick armrest located on the outboard side of the seat can be adjusted in height and tilt angle so that the pilots can rest their arm in an optimum position with respect to the side stick controller. A third occupant seat and a folding seat for a fourth occupant are also available.

The **cabin** also includes the *galleys* (Figure 4.5) and *lavatories* (Figure 4.6), in addition to the *passenger seats* (Figure 4.2).

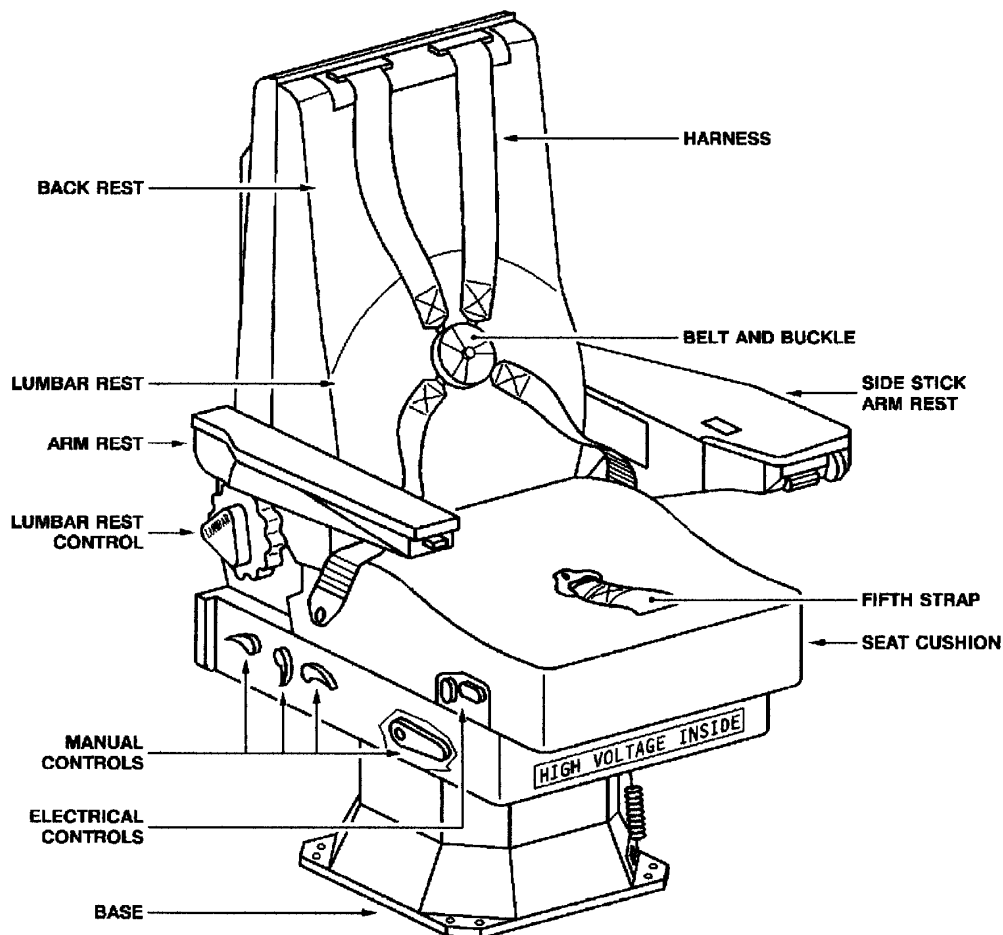
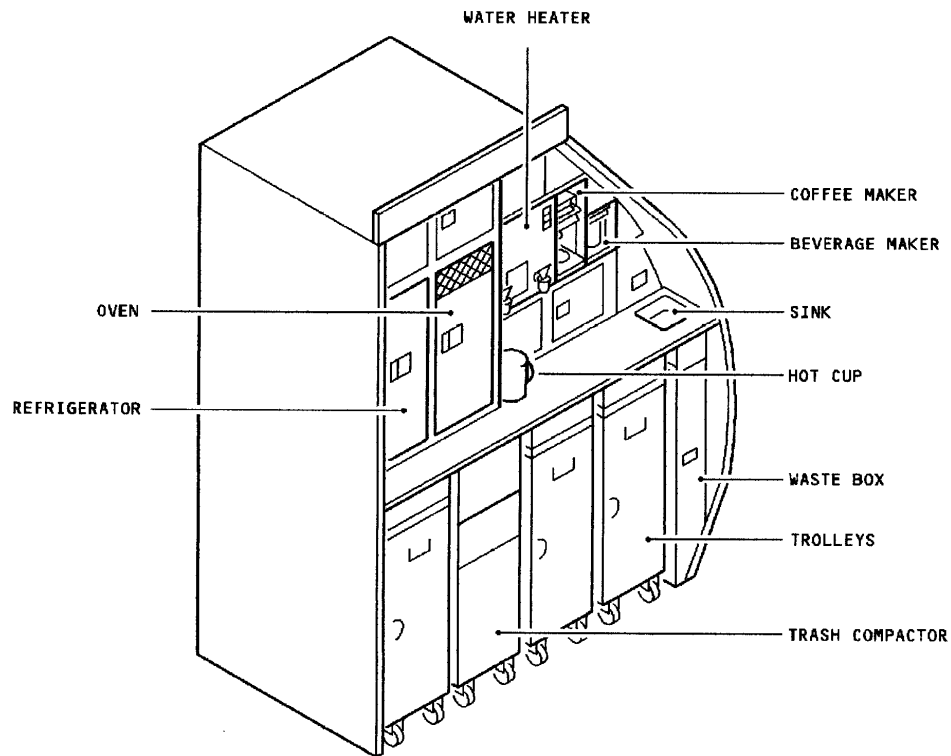
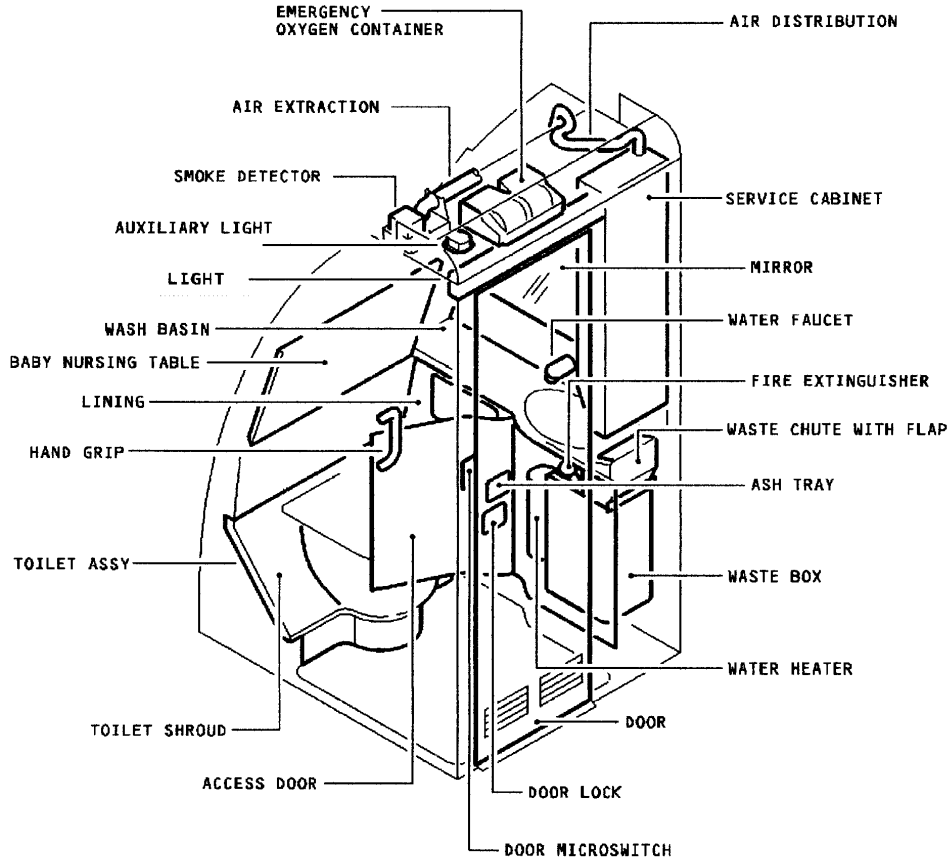


Figure 4.4 A321 captain/first officer seat



**Figure 4.5** Galley equipment (A321, example)



**Figure 4.6** Lavatory equipment (A321, example)